5.7 Hazardous Materials and other Chemical Hazards

A major hazardous materials hazard event has been determined to have a **Medium** likelihood of occurrence in Benton County within the five-year planning cycle of this Plan. Therefore, although some hazard characterization information is presented below, no further risk assessment has been performed for this hazard. Additional analyses to further characterize the risks of this hazard and the development of suitable mitigation action items will be conducted in the future based on periodic reviews of this hazard mitigation plan and available resources

5.7.1 Nature of the Hazard

Because of their chemical, physical, or biological nature, hazardous materials can pose a potential risk to health and safety, property, and the environment. In addition, many chemicals that are not categorized as hazardous can adversely affect human health and safety and the environment if spilled or otherwise released in sufficient quantities. Precautions against spills and releases plus quick response, containment, and cleanup are key to limiting the hazardous materials and chemical hazard.

Historical Events

To be determined

Characteristics of the Hazard

Hazardous materials are chemical substances, which, if released or misused can pose a threat to human health and safety and the environment. These chemicals are used in industry, agriculture, medicine, research, consumer goods, and in the home. Hazardous materials may be in the form of explosives, flammable and combustible substances, poisons, and reactive materials. Hazardous materials are routinely transported through the community via truck, railroad, waterway, and pipelines. The majority of chemical accidents occur in the home from misuse of flammable or combustible materials; however, these are typically small-scale accidents affecting individuals. Larger incidents involving hazardous materials typically occur because of accidents at an industrial facility or during transportation.

The presence of a hazardous material may or may not be readily evident. Some hazardous materials do not have an odor or taste. Some hazardous materials can cause immediate physical reactions such as nausea or watering eyes.

Chemical Properties
All chemicals, including hazardous chemicals, are described in terms of their physical, chemical, and biological properties. These properties can be used to predict the likely behavior of hazardous materials in various circumstances, and to reduce and eliminate potentially hazardous situations. Commonly measured physical/chemical properties of interest include[i]:

Physical State at 20^0 C – The physical nature of the chemical (solid, liquid, or gas) at 20^0 C (i.e., room temperature). Changing the temperature may alter the physical state.

Boiling Point – The temperature at which a liquid changes to gas under standard atmospheric pressure (760 mm mercury). Lowering the atmospheric pressure lowers the boiling point, while higher pressures result in elevated boiling points.

Melting Point – The temperature at which a solid changes to a liquid.

Vapor Pressure – The pressure exerted by the vapor in equilibrium with its liquid at a given temperature. Vapor pressure is a measure of the relative volatility of chemicals, and increases with increasing temperature. Liquids with high vapor pressures generally represent a greater fire hazard than those with low vapor pressures.

Vapor Density – The mass per unit volume of a given vapor/gas relative to that of air. Heavy vapors present a particular hazard because of the way they accumulate: if toxic they may poison workers; if nontoxic they may displace air and cause suffocation by oxygen deficiency; if flammable, once presented with an ignition source, they represent a fire or explosion hazard. Gases heavier than air include carbon dioxide, chlorine, hydrogen sulfide, and sulfur dioxide.

Density – The mass per unit volume of any substance, including liquids. The density of a liquid determines whether a spilled material that is insoluble in or immiscible with water will sink or float on water. Knowledge of this behavior is essential in checking whether to use water to suppress a fire involving this material.

Specific Gravity – The ratio of the density of a liquid as compared with that of water. Insoluble materials will sink or float in water depending on their specific gravity.

Solubility – The amount of a given substance (the solute) that dissolves in a unit volume of a liquid (the solvent). This property is important in the handling and recovery of spilled materials.

Flashpoint – The lowest temperature of a liquid at which it gives off enough vapor to form an ignitable mixture with air near the surface of the liquid within the vessel used.

Fire Point – The temperature at which a liquid gives off enough vapor to continue to burn when ignited.

Auto-Ignition Temperature – The temperature at which an ignition occurs without an ignition source and the material continues to burn without further heat input.

Flammable or Explosive Limits – The upper and lower vapor concentrations at which a mixture will burn or explode.

Heat Content – The heat released by a complete combustion of a unit weight of material.

Octanol/Water Partition Coefficient – The equilibrium ratio of the concentrations of material partitioned between octanol and water. This coefficient is considered to be an index of the potential of a chemical to be bioaccumulated.

Threshold Limit Value – The exposure level under which most people can work for eight hours a day, day after day, with no harmful effects. (A table of these values and accompanying precautions for most common industrial materials is published annually by the American Conference of Governmental Industrial Hygienists.)

pK_a – The negative logarithm of the equilibrium constant for acids or bases. This is an indicator of the strength of an acid or base.

Hazard Categories
Regulatory requirements establish four categories of hazard for chemicals and materials:

1) Reactivity
2) Ignitability/flammability
3) Corrosivity
4) EP toxicity

Reactivity refers to a material's characteristics when mixed with water. A solid waste is categorized as a hazardous waste if, when mixed with water, it: (1) reacts violently; (2) forms potentially explosive mixtures; or (3) generates toxic gases, vapors, or fumes in a quantity sufficient to be harmful to human health of the environment.

Flammability is the tendency of a material to burn, and is usually measured by flashpoint. The most common systems for designating flashpoint are the Department of Transportations (DOT) definitions, the National Fire Protection Association's (NFPA) system, and the Environmental Protection Agency's Resource Protection and Recovery Act's definition of ignitable wastes. NFPA defines a flammable liquid as one having a flashpoint of 200^0 F or lower, divided into five categories as shown in Table 5.7-1.

Table 5.7-1 NFPA Flammable Liquid Categories

Category	Flashpoint (degrees F)	Boiling Point (degrees F)
IA	< 73	<100
IB	<73	>100
IC	>73 and < 100	<100
II	>100 and < 140	
III	> 140	

The DOT system defines flammable materials as those with a flashpoint of 100^0 F or less; combustible materials as those with a flashpoint between 100^0 F and 200^0 F; and those with a flashpoint of > 200^0 F as nonflammable. EPA designates those wastes with a flashpoint of less than 140^0 F as ignitable hazardous wastes.

The corrosivity hazard relates to acids and bases, and is defined in terms of pH (i.e., wastes are considered hazardous if they have a pH < 2 or > 12.5). Acids and bases are typically highly soluble in water. Concentrated solutions will attack skin and other materials; bases are generally worse than acids as they will penetrate the skin.

EP toxicity is a measure of a material's toxicity to humans.

5.7.2 Hazard Assessment

Hazard Identification

An accident involving hazardous materials could occur anywhere. Communities located near chemical manufacturing plants, or other industrial facilities that use or store large quantities of hazardous chemicals are particularly at risk. However, given that hazardous materials are routinely and frequently transported on local roadways, railways, and waterways, all areas of Benton County are potentially exposed.

Vulnerability Assessment

To Be Determined

Risk Analysis

To Be Determined

5.7.3 Community Concerns

Current Conditions

Current conditions are described in Benton County's Comprehensive Emergency Management Plan.

Ongoing Mitigation

The Emergency Planning and Community Right to Know Act (EPCRA) of 1986
In response to the disaster in Bhopal and other hazardous materials releases, on October 17, 1986, the Superfund Amendments and Reauthorization Act of 1986 (SARA) was signed into law. Title III: "The Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, within SARA, establishes requirements for federal, state, and local governments, and industry regarding emergency response planning and community right-to-know on hazardous chemicals. Title III requires state and local governments and industries to take action to inform citizens about chemical hazards in their communities and to develop emergency plans.

Title III requires each community to establish a Local Emergency Planning Committee (LEPC) to be responsible for developing an emergency plan for responding to chemical emergencies in the community. Benton County has established a Comprehensive Emergency Management Plan. The Comprehensive Emergency Management Plan includes the following: an identification of local facilities and transportation routes where hazardous materials are present; procedures for immediate response in case of an accident (including a community-wide evacuation plan); procedures for notifying the community when an accident has occurred; the names of response coordinators at local facilities; and a plan for conducting exercises to test the plan

The U.S. Department of Transportation employs a labeling and placard system for identifying the types and characteristics of hazardous materials being carried by truck, rail, and barge or shipping. The placard system allows local emergency officials to identify the nature and potential health threat of chemicals under transport, and to determine the proper response procedures in the event of an accident involving hazardous materials.

Washington State Hazardous Materials Program
The State Hazardous Materials Program implements the requirements of EPCRA through several key areas:

- Providing oversight and funding to ensure that state, tribal and local governments and industries have comprehensive emergency plans to protect the public from chemical and/or other hazardous material accidents.

- Ensuring that emergency responders have the proper training and skills needed to handle potential incidents involving the release of hazardous materials.

- Responding to local planning, response, and mitigation needs through grant programs, professional training, plan review, and technical assistance.

5.7.4 Mitigation Strategies

Specific mitigation action strategies and/or potential mitigation measures have not been determined.

Possible broad mitigation strategies include:

a) Eliminate the possibility of a chemical fire, spill or airborne release, whenever feasible (for example, by substituting safer chemicals or non-chemical alternatives).

b) Reduce the likelihood of a chemical fire, spill or airborne release, whenever chemical hazards cannot be eliminated; (for example, by adding sensors, alarms, automatic shutoffs, or other controls).

c) Mitigate the potential consequences of an unanticipated chemical fire, spill or airborne release, whenever chemical hazards cannot be eliminated or controlled (for example by planning for emergencies and training and equipping the public health community to respond).

d) Keep unavoidably hazardous facilities away from places where people live, work, play, and learn (for example by establishing adequate buffer zones).

5.7.5 Resources

State Resources

To be determined.

Federal Resources

U.S. Department of Transportation

U.S. Coast Guard

U.S. Environmental Protection Agency
Other Resources

[i] Material excerpted from "Chemistry of Hazardous Materials" by D.B. Cox and M. G. Browman; Chapter 1 of the Handbook of Hazardous Materials Management, Institute of Hazardous Materials Management, 1990.